CLAIMS

1. Apparatus for inspecting the under side of a vehicle, the apparatus comprising:

a plurality of cameras located at predetermined positions and angles relative to one another, the cameras pointing in the general direction of the area of an object to be inspected; and

image processing means provided with

(i) a first module for calibrating the cameras and for altering the perspective of image frames from said cameras and

(ii) a second module for constructing an accurate mosaic from said altered image frames.

2. Apparatus as claimed in Claim 1 wherein the cameras are stationary with respect to the vehicle.

3. Apparatus as claimed in Claim 1 or Claim 2 wherein the plurality of cameras are arranged in a linear array.

4. Apparatus as claimed in any preceding Claim wherein the cameras have overlapping fields of view.

5. Apparatus as claimed in any preceding Claim wherein the first module is provided with camera positioning means which calculate the predetermined position of each of said cameras as a function of the camera field of view, the angle of the camera to the vertical and the vertical distance between the camera and the position of the vehicle underside or object to be inspected.

6. Apparatus as claimed in Claim 5 wherein camera perspective altering means are provided which apply an alteration to the image frame calculated using the angle information from each camera.

7. Apparatus as claimed in any preceding Claim wherein the images from each of said cameras are altered to the same scale.

8. Apparatus as claimed in Claim 6 or Claim 7 wherein the camera perspective altering means models a shift in the angle and position of each camera relative to the others and determines an altered view from the camera.

9. Apparatus as claimed in any preceding Claim wherein the first module includes camera calibration means adapted to correct spherical lens distortion and/or non-equal scaling of pixels and/or the skew of two image axes from the perpendicular.

10. Apparatus as claimed in any preceding Claim wherein the second module is provided with means for comparing images in sequence which allows the images to be overlapped.

11. Apparatus as claimed in Claim 10 wherein a Fourier analysis of the images is conducted in order to obtain the translation of x and y pixels relating the images.

12. A method of inspecting an area of an object, the method comprising the steps of:

(a) positioning at least one camera, taking n image frames, proximate to the object;

(b) acquiring a first frame from the at least one camera;

(c) acquiring the next frame from said at least one camera;

(d) applying calibration and perspective alterations to said frames;

(e) calculating and storing mosaic parameters for said frames;

(f) repeating steps (c) to (e) n-1 times; and

(g) mosaicing together the n frames from said at least one camera into a single mosaiced image.

13. A method as claimed in Claim 12 wherein the object is the underside of a vehicle.

14. A method as claimed in Claim 12 or Claim 13 wherein a plurality of cameras is provided, each located at predetermined positions and angles relative to one another, the cameras pointing in the general direction of the object.

15. A method as claimed in Claim 14 wherein the predetermined position of each of said cameras is calculated as a function of the camera field of view and/or the angle of the camera to the vertical and/or the vertical distance between the camera and the position of the vehicle underside.

16. A method as claimed in any one of Claims 12 to 15 wherein images from each of said cameras are altered to the same scale.

17. A method as claimed in any one of Claims 14 to 16 wherein perspective alteration applies a correction to the image frame calculated using relative position and angle information from each camera.

18. A method as claimed in Claim 17 wherein perspective alteration models a shift in the angle and position of each camera relative to the others and determines the view therefrom.

19. A method as claimed in any one of Claims 12 to 18 wherein calibration of the at least one camera corrects spherical lens distortion and/or non-equal scaling of pixels and/or the skew of two image axes from the perpendicular.

20. A method as claimed in any one of Claims 12 to 19 wherein mosaicing the images comprises comparing images in sequence, applying fourier analysis to the said images in order to obtain the translation in x and y pixels relating the images.

21. A method as claimed in Claim 20 wherein the translation is determined by

(a) Fourier transforming the original images;

(b) Computing the magnitude and phase of each of the images;

(c) Subtracting the phases of each image;

(d) Averaging the magnitudes of the images; and

(e) Inverse Fourier transforming the result to produce a correlation image.

22. A method as claimed in any one of Claims 12 to 21 wherein the positioning of the at least one camera proximate to the vehicle underside is less than the vehicle's road clearance.

23. A method of creating a reference map of an object, the method comprising the steps of obtaining a single mosaiced image, selecting an area of the single mosaiced image and recreating or selecting the frame from which said area of the mosaiced image was created.

24. A method as claimed in Claim 23 wherein the area of the single mosaiced image is selected graphically by using a cursor on a computer screen.